WHAT IS CLAIMED IS:

1. An apparatus for transmitting data in a mobile communication system including at least three transmission antennas of first to third transmission antennas, and using an overlapped antenna scheme for grouping the first and second transmission antennas into a first transmission antenna group and grouping the second and third transmission antennas into a second transmission antenna group, the apparatus comprising:

first and second modulators for receiving L information bit streams to be transmitted through the first transmission antenna group, modulating each of the L information bit streams in a predetermined modulation scheme, and outputting first and second modulated symbol streams;

third and fourth modulators for receiving L other information bit streams to be transmitted through the second transmission antenna group, modulating each of the L information bit streams in the modulation scheme, and outputting third and fourth modulated symbol streams;

first to fourth puncturers for receiving the first to fourth modulated symbol streams, respectively, and puncturing at least one modulated symbol in a predetermined position among the received first to fourth modulated symbol streams; and

a multiplexer for transmitting a modulated symbol stream output from the first puncturer through the first transmission antenna, transmitting a modulated symbol stream output from the second puncturer and a modulated symbol stream output from the third puncturer through the second transmission antenna after summing up the modulated symbol streams, and transmitting a modulated symbol stream output from the third puncturer through the third transmission antenna.

2. The apparatus of claim 1, wherein for the modulated symbol streams output from the first to fourth modulators, the first to fourth puncturers each set the number of punctured modulated symbols to the same number.

3. The apparatus of claim 1, wherein the first to fourth puncturers each set modulated symbol streams output from the first to fourth modulators so that a position where the modulated symbol is punctured is periodically repeated.

4. The apparatus of claim 1, wherein if the number of modulated symbols constituting the modulated symbol stream is 4, the first and second puncturers determine a position where the modulated symbol is punctured according to a puncturing matrix P_1 given by

$$P_1=\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the first puncturer, and a second row is applied to the second puncturer.

5. The apparatus of claim 4, wherein if the number of modulated symbols constituting the modulated symbol stream is 4, the third and fourth puncturers determine a position where the modulated symbol is punctured according to a puncturing matrix P_2 given by

$$P_2=\begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the third puncturer, and a second row is applied to the fourth puncturer.

6. The apparatus of claim 1, wherein if the number of modulated symbols constituting the modulated symbol stream is 8, the first to fourth

puncturers determine a position where the modulated symbol is punctured according to a puncturing matrix P_3 given by

$$P_3=\begin{bmatrix}1&1&1&1&1&1&1&1\\1&0&1&0&1&0&1&0\\0&1&0&1&0&1&0&1\\1&1&1&1&1&1&1&1\end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the first puncturer, a second row is applied to the second puncturer, a third row is applied to the third puncturer, and a fourth row is applied to the fourth puncturer.

7. The apparatus of claim 1, wherein if the number of modulated symbols constituting the modulated symbol stream is 8, the first to fourth puncturers determine a position where the modulated symbol is punctured according to a puncturing matrix P_4 given by

$$P_4=\begin{bmatrix}1&1&1&0&1&1&1&0\\1&0&1&1&1&0&1&1\\0&1&1&1&0&1&1&1\\1&1&0&1&1&1&0&1\end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the first puncturer, a second row is applied to the first puncturer or the second puncturer, a third row is applied to the second puncturer or the third puncturer, a fourth row is applied to the fourth puncturer, and the modulation symbol is punctured in a position of an element '0'.

8. A method for transmitting data in a mobile communication system including at least three transmission antennas of first to third transmission antennas, and using an overlapped antenna scheme for grouping the first and second transmission antennas into a first transmission antenna group and grouping the second and third transmission antennas into a second transmission antenna group, the method comprising the steps of:

receiving L information bit streams to be transmitted through the first transmission antenna group, modulating each of the L information bit streams in a predetermined modulation scheme, and outputting first and second modulated symbol streams;

receiving L other information bit streams to be transmitted through the second transmission antenna group, modulating each of the L information bit streams in the modulation scheme, and outputting third and fourth symbol modulated streams;

receiving the first to fourth modulated symbol streams, and puncturing at least one modulated symbol in a predetermined position among the received first to fourth modulated symbol streams, and outputting first to fourth punctured modulated symbol streams; and

transmitting the first punctured modulated symbol stream through the first transmission antenna, transmitting the second and third punctured modulated symbol streams through the second transmission antenna after summing up the second and third punctured modulated symbol streams, and transmitting the fourth punctured modulated symbol stream through the third transmission antenna.

9. The method of claim 8, wherein for the first to fourth modulated symbol streams, the number of punctured modulated symbols is set to the same number.

10. The method of claim 8, wherein the first to fourth modulated symbol streams are set so that a position where the modulated symbol is punctured is periodically repeated.

11. The method of claim 8, wherein if the number of modulated symbols constituting the modulated symbol stream is 4, a position of the first and

second modulated symbol streams where the modulated symbol is punctured is determined according to a puncturing matrix P_1 given by

$$P_1=\begin{bmatrix}1 & 1 & 1 & 1\\ 1 & 0 & 1 & 0\end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the first modulated symbol stream, a second row is applied to the second modulated symbol stream, and the modulated symbol is punctured in a position of an element '0'.

12. The method of claim 11, wherein if the number of modulated symbols constituting the modulated symbol stream is 4, a position of the third and fourth modulated symbol streams where the modulated symbol is punctured is determined according to a puncturing matrix P_2 given by

$$P_2=\begin{bmatrix}1 & 0 & 1 & 0\\ 1 & 1 & 1 & 1\end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the third modulated symbol stream, a second row is applied to the fourth modulated symbol stream, and the modulated symbol is punctured in a position of an element '0'.

13. The method of claim 8, wherein if the number of modulated symbols constituting the modulated symbol stream is 8, a position of the first to fourth modulated symbol streams where the modulated symbol is punctured is determined according to a puncturing matrix P_3 given by

$$P_3=\begin{bmatrix}1 & 1 & 1 & 1 & 1 & 1 & 1 & 1\\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0\\ 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1\\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1\end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the first modulated symbol stream, a second row is applied to the second modulated symbol stream, a third row is

applied to the third modulated symbol stream, a fourth row is applied to the fourth modulated symbol stream, and the modulated symbol is punctured in a position of an element '0'.

14. The method of claim 8, wherein if the number of modulated symbols constituting the modulated symbol stream is 8, a position of the first to fourth modulated symbol streams where the modulated symbol is punctured is determined according to a puncturing matrix P_4 given by

$$P_4=\begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 & 1 & 0 & 1 \end{bmatrix}$$

where a column corresponds to a transmission period, a row corresponds to a transmission antenna, a first row is applied to the first modulated symbol stream, a second row is applied to the first modulated symbol stream or the second modulated symbol stream, a third row is applied to the second modulated symbol stream or the third modulated symbol stream, a fourth row is applied to the fourth modulated symbol stream, and the modulated symbol is punctured in a position of an element '0'.

15. An apparatus for receiving data in a mobile communication system which receives through N reception antennas modulated symbol streams transmitted through M transmission antennas from a transmitter, the apparatus comprising:

a channel estimator connected to each of the N reception antennas, for channel-estimating reception symbol streams output from the N reception antennas;

an interference suppressor connected to each of the N reception antennas, for eliminating a reception symbol in at least one predetermined position as an

interference component from each of reception symbol streams output from the N reception antennas;

M modulators for modulating each of all information bit streams that can be possibly transmitted from the transmitter, in a predetermined modulation scheme, and outputting modulated symbol streams;

M puncturers for puncturing at least one modulated symbol in a predetermined position from each of modulated symbol streams output from the M modulators; and

a transmission symbol stream detector for detecting transmission symbol streams transmitted from the transmitter by considering parallel transition based on the reception symbol streams and a hypothetic channel output in a case where modulated symbol streams output from the M puncturers were transmitted through the same channel as a channel estimated by the channel estimator.

16. The apparatus of claim 15, wherein for the modulated symbol streams output from the M modulators, the M puncturers each set the number of punctured modulated symbols to one of a same number or a different number.

17. The apparatus of claim 15, wherein the M puncturers each set modulated symbol streams output from the M modulators so that a position where the modulated symbol is punctured is periodically repeated.

18. A method for receiving data in a mobile communication system which receives through N reception antennas modulated symbol streams transmitted through M transmission antennas from a transmitter, the method comprising the steps of:

channel-estimating reception symbol streams output from the N reception antennas;

eliminating a reception symbol in at least one predetermined position as an interference component from each of reception symbol streams output from the N reception antennas;

modulating each of all information bit streams that can be possibly transmitted from the transmitter, in a predetermined modulation scheme, and outputting M modulated symbol streams;

puncturing at least one modulated symbol in a predetermined position from each of the M modulated symbol streams; and

detecting transmission symbol streams transmitted from the transmitter by considering parallel transition based on the reception symbol streams and a hypothetic channel output in a case where modulated symbol streams from which at least one modulated symbol was punctured were transmitted through the same channel as the channel-estimated channel.

19. The method of claim 18, wherein for the M modulated symbol streams, the number of punctured modulated symbols is set to the same number.

20. The method of claim 18, wherein the M modulated symbol streams are set so that a position where the modulated symbol is punctured is periodically repeated.